Interreg Baltic Sea Region

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SUSTAINABLE WATERS WaterMan

Water Recycling Toolbox

Water recycling strategy for Bornholm Island / DK

Bornholm's Energy & Utility Co. A/S

Program

Local water management situation

Local model strategy

BORNHOLMS ENERGI & FORSYNING

- Heavy rainfall – overflow of sewage system and nutrient outflow to the Baltic sea
- Draughts – impacting the agriculture and groundwater formation
- Tourist season puts a pressure on the wastewater treatment plants and drinking water supply
- Challenges with drinking water quality – organic micropollutants

- Retention of water:
  - Increase level of groundwater table
  - Reservoirs for irrigation
  - Restoring wetlands
- Connecting different catchment areas for balancing water supply
- Involving citizens:
  - Campaigns focusing on saving water/ decreasing the use

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Initial exchange

Water recycling strategy for Bornholm Island / DK

Bornholm's Energy & Utility Co. A/S

9 November 2023

First take on the water reuse strategy

BORNHOLMS ENERGI & FORSYNING

All partner meeting Bornholm – 9-11-2023

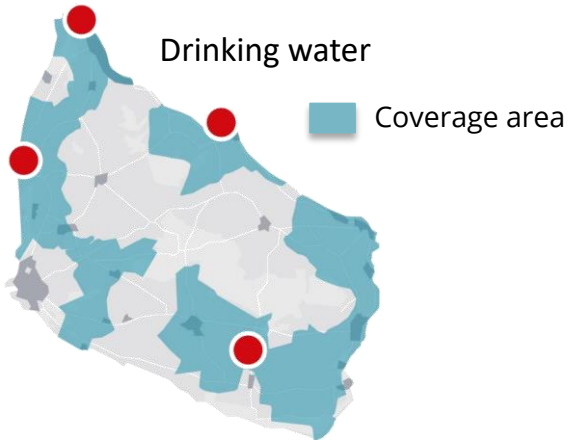
Sara Björkqvist

AGENDA

- Reminder of who we are
- Possible scope & format of the strategy
- Related strategic documents/ regulation at local and regional level
- Stakeholders to be involved

WHO WE ARE

- Bornholm's Water and Wastewater are utility companies
  - Main activities are to supply drinking water / treat wastewater
  - Economic regulation
    - Principle of balance between income and expenses (non-profit)
    - All expenses are paid by the customers (establishment, operation, maintenance etc.)
    - Expenses must be justified as necessary for the service we provide



POSSIBLE SCOPE & FORMAT OF THE STRATEGY

- Synergies with related activities
  - Bornholm's Water –
    Groundwater protection and increase of infiltration of new groundwater
  - Bornholm's Wastewater –
    Protecting the sewer system from excess stormwater by retaining water (for ex. irrigation reservoirs)
  - Format – to be decided, but probably additions to other strategies/ related activities

SYNERGIES WITH GROUNDWATER PROTECTION

- New designation of nitrate sensitive areas, meaning the groundwater in this area needs to be protected from nitrate (fertilizers, i.e. conventional farming)
- Municipality responsible for drafting and implementing a plan for groundwater protection, in cooperation with BEOF and other relevant stakeholders
- Alternatives to farmlands could be **wetlands**, forest, biodiversity areas, solar power, recreational purposes etc.
- Alternatives to farmlands based on a voluntary willingness from the landowners

Map of nitrate sensitive areas, from the Jupiter database (https://data.geus.dk/)

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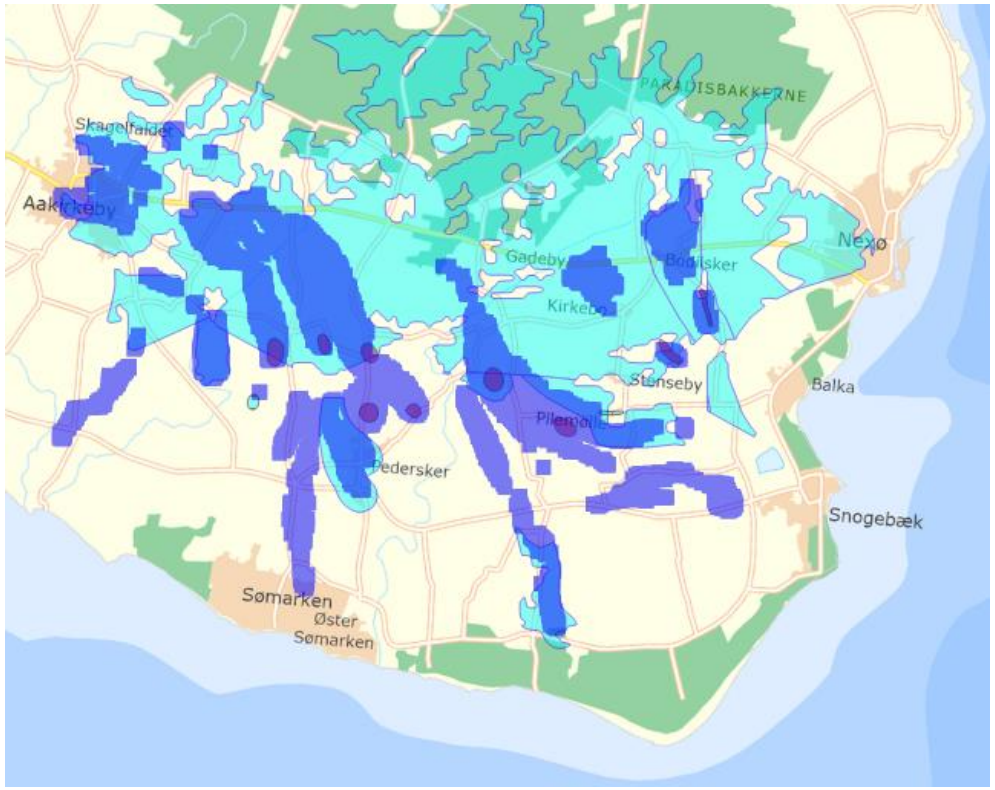
SYNERGIES WITH GROUNDWATER PROTECTION

9-11-2023



Map of ”Smålyngen” – Bornholm’s largest groundwater magasin, map povided by Bornholm's regional municipality

Designated area – groundwater protection

BEOF well –
Circle indicates 1 year of transportation time for the water to reach the well

Groundwater forming areas

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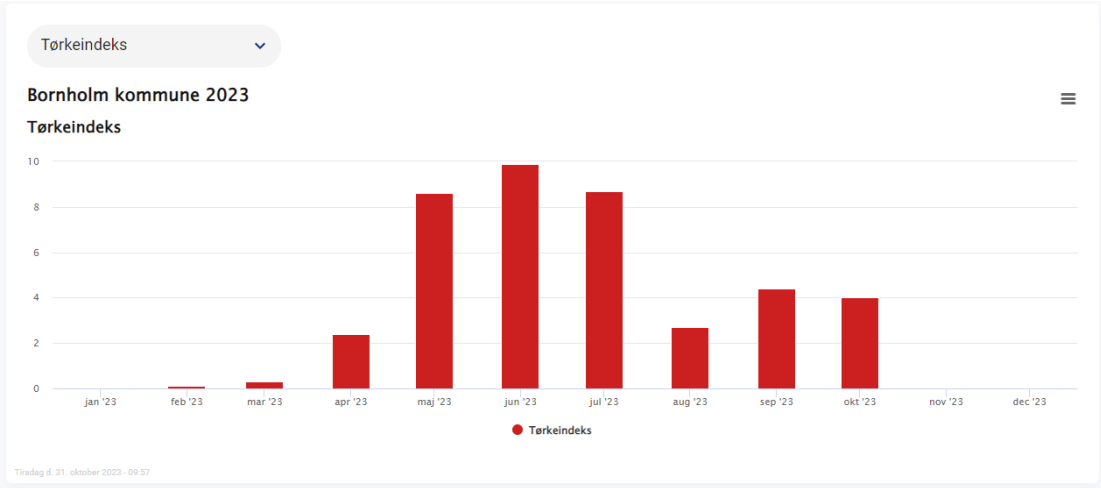
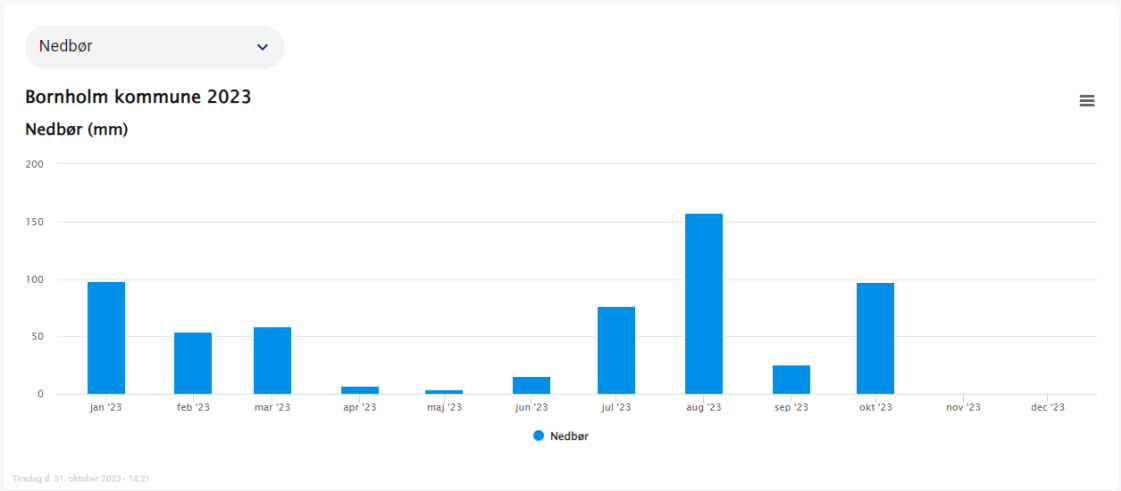
SYNERGIES WITH EXCESS STORMWATER

- Protecting the sewer system from excess stormwater – irrigation reservoirs/ “mini wetlands”
  - Farmers are interested in irrigation reservoirs due to periods of draught



Draught index – Vejrarkiv (dmi.dk)



Rainfall– Vejrarkiv (dmi.dk)

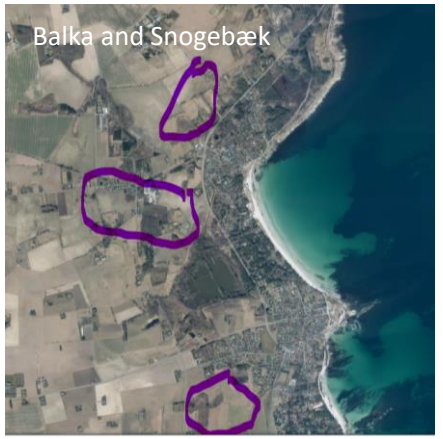
SYNERGIES WITH EXCESS STORMWATER

- Protecting the sewer system from excess stormwater – irrigation reservoirs/ “mini wetlands”
  - Farmers are obliged to reduce the emission of nitrate by constructing “mini wetlands”

Foto: SEGES
Picture of "mini wetland" – Minivådområder 2021 (lbst.dk)

SYNERGIES WITH EXCESS STORMWATER

- Protecting the sewer system from excess stormwater – irrigation reservoirs/ “mini wetlands”
  - Identification of “problem areas” for BEOF and synergies with potential location of irrigation reservoirs/ “mini wetlands”
  - Needs to be a match with an interested farmer



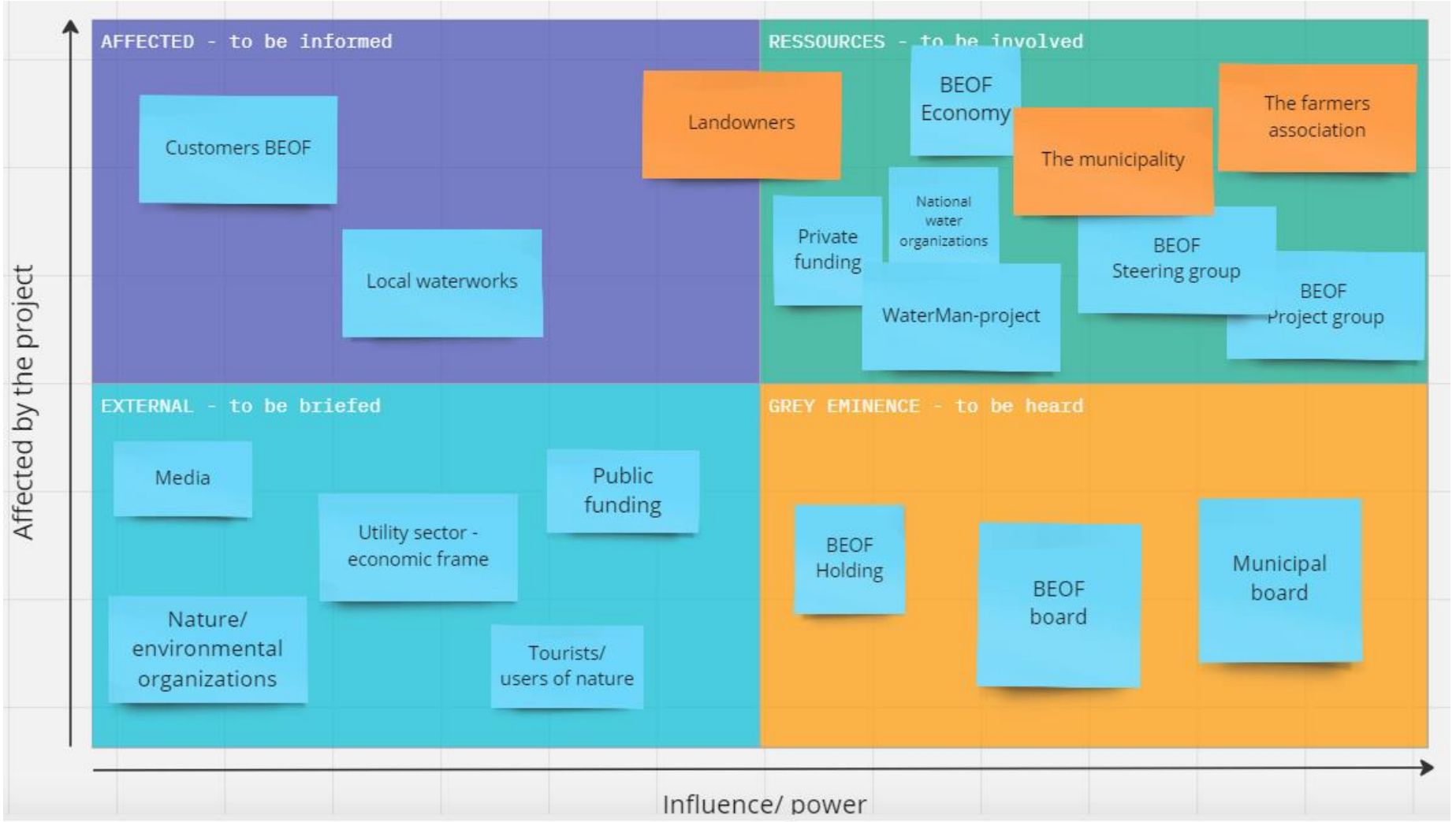
Areas identified with Scalgo and operational experience

RELATED STRATEGIC DOCUMENTS/ REGULATION

- BEOFs internal strategic initiative regarding groundwater protection
- Designation of areas in need of groundwater protection – National regulation
- “Mini wetlands” – National plans to improve the quality of Danish waters (requirements to the farmer’s nutrient reduction is targeting the Baltic Sea)

STAKEHOLDERS

9-11-2023



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SUSTAINABLE WATERS WaterMan

1st Peer-review session

Water recycling strategy for Bornholm Island / DK

Bornholm's Energy & Utility Co. A/S

14 March 2024

Further elaborated approach of BEOF's water reuse strategy

BORNHOLMS ENERGI & FORSYNING

All partner meeting Klaipeda – 14.03.2024

Agenda

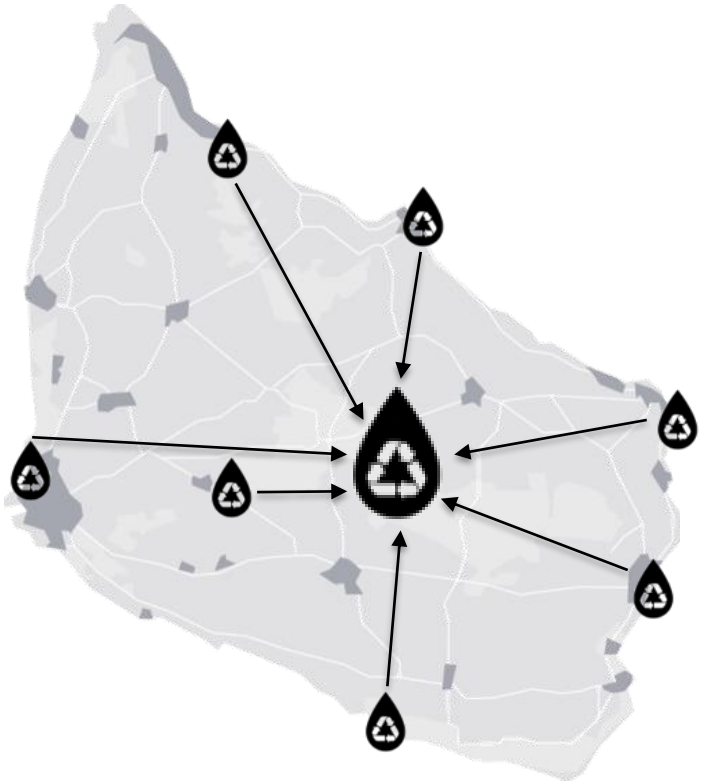
- News since last meeting
- Wastewater
  - Scope of the strategy
    - Overview
    - Baseline study/ preparatory surveys/ possible features
    - The “storyline”
  - Stakeholder analysis
  - The process
    - Communication, local dialogue events & further means for stakeholder involvement
    - Preparatory surveys and feasibility studies
- Surface water
  - Potential strategic synergies with BEOF activities

BORNHOLMS ENERGI & FORSYNING

News since last meeting

- BEOF will draft a business strategy for wastewater starting this spring, with focus on constructing a new centralized WWTP, and handling excess stormwater in the sewer system
  - Circularity and possibilities to reuse the sludge and the wastewater,
  - Reduce the impact on the recipient,
  - Reasonable prices

- Centralized WWTP
  - Starting the planning during Spring 2024



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Scope of the strategy – wastewater

Feasibility study with pilot
- Sandfilter for purification of WWTP effluent
- Reuse: agricultural irrigation

Feasibility study
- Treatment of wastewater/ brackish water
- Reuse: technical water to PtX

BEOF's business strategy for wastewater
- Wastewater as a resource

BORNHOLMS ENERGI & FORSYNING

Scope of the strategy – wastewater

- Baseline study/ preparatory surveys/ possible features
  - In process, below is a draft of the “baseline study”

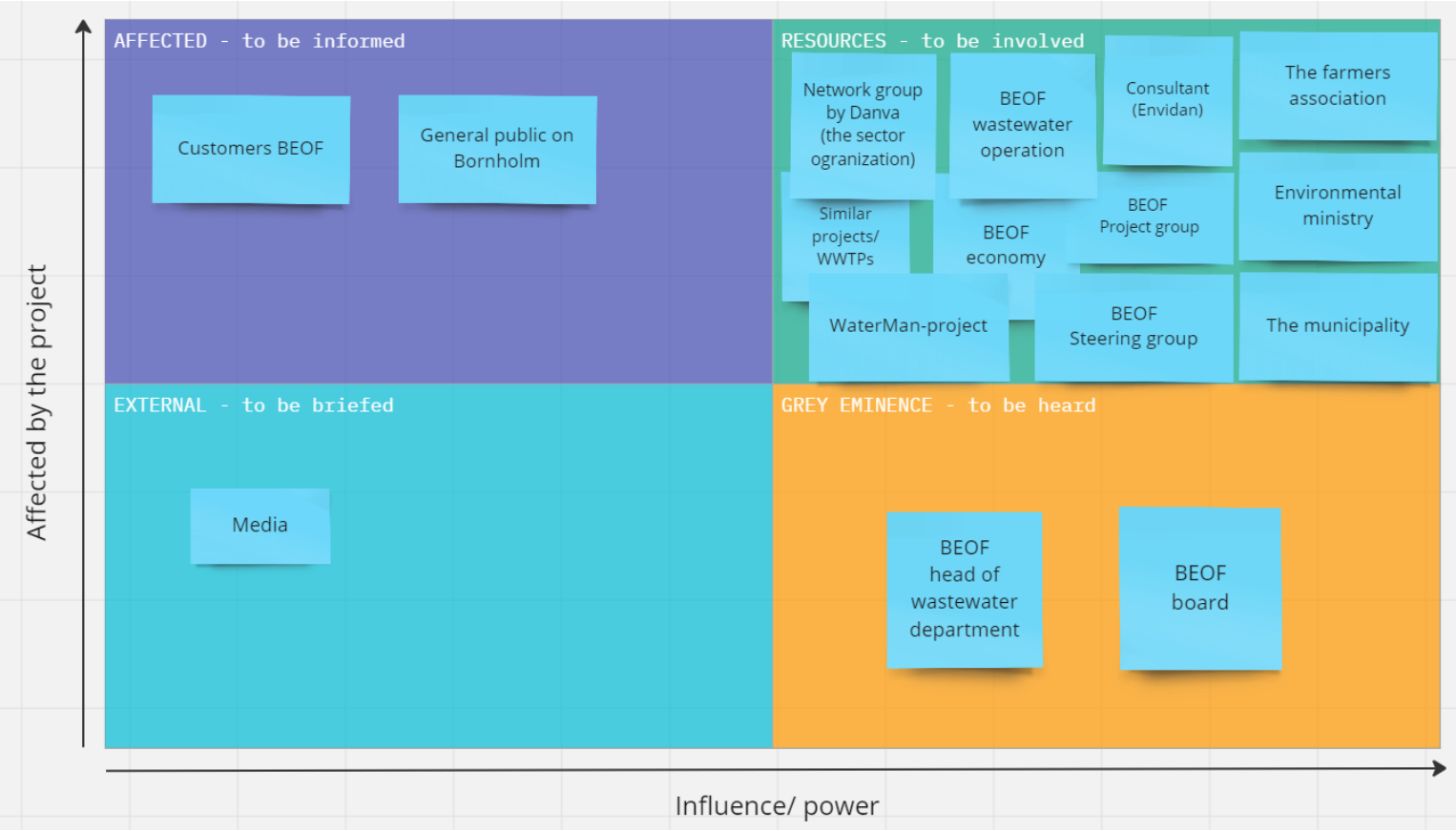
BORNHOLMS ENERGI & FORSYNING

Scope of the strategy – wastewater

- Baseline study/ preparatory surveys/ possible features –
  The “storyline”
  - Groundwater levels will remain the same or possible increase in the future
  - The groundwater is however primarily reserved for drinking water purposes
  - There will be periods of draught and it seems like the need for agricultural irrigation will increase in the future
  - Possible large future water consumers are PtX and the agriculture (irrigation)
  - Reused wastewater could be a source of water for PtX and the agriculture

Stakeholders – wastewater

- The sandfilter / agricultural irrigation



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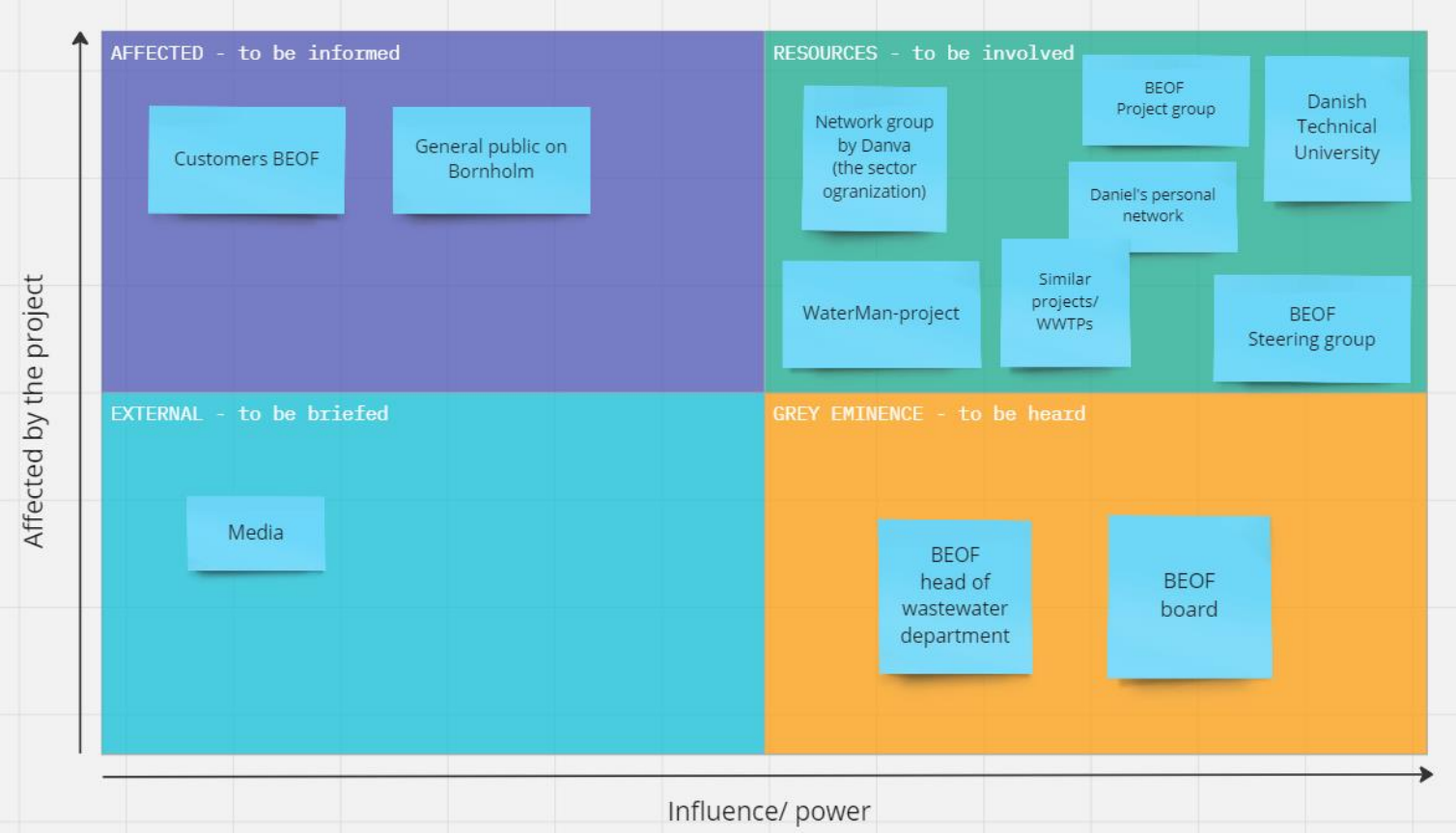
Stakeholders – wastewater

- PtX / technical water



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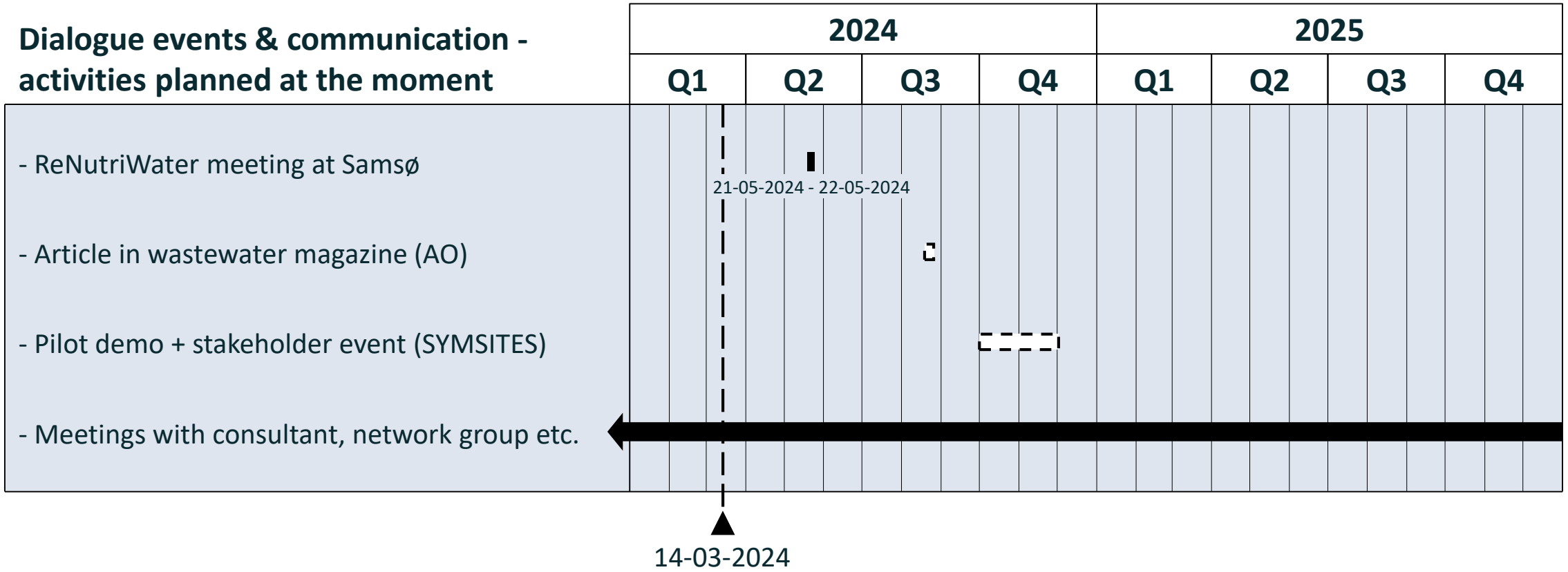
The process – wastewater



Further contact to the Environmental Ministry will be planned when there are some results from the pilot.
Communication towards general public probably during the autumn, and possibly at “Folkemødet” in June.

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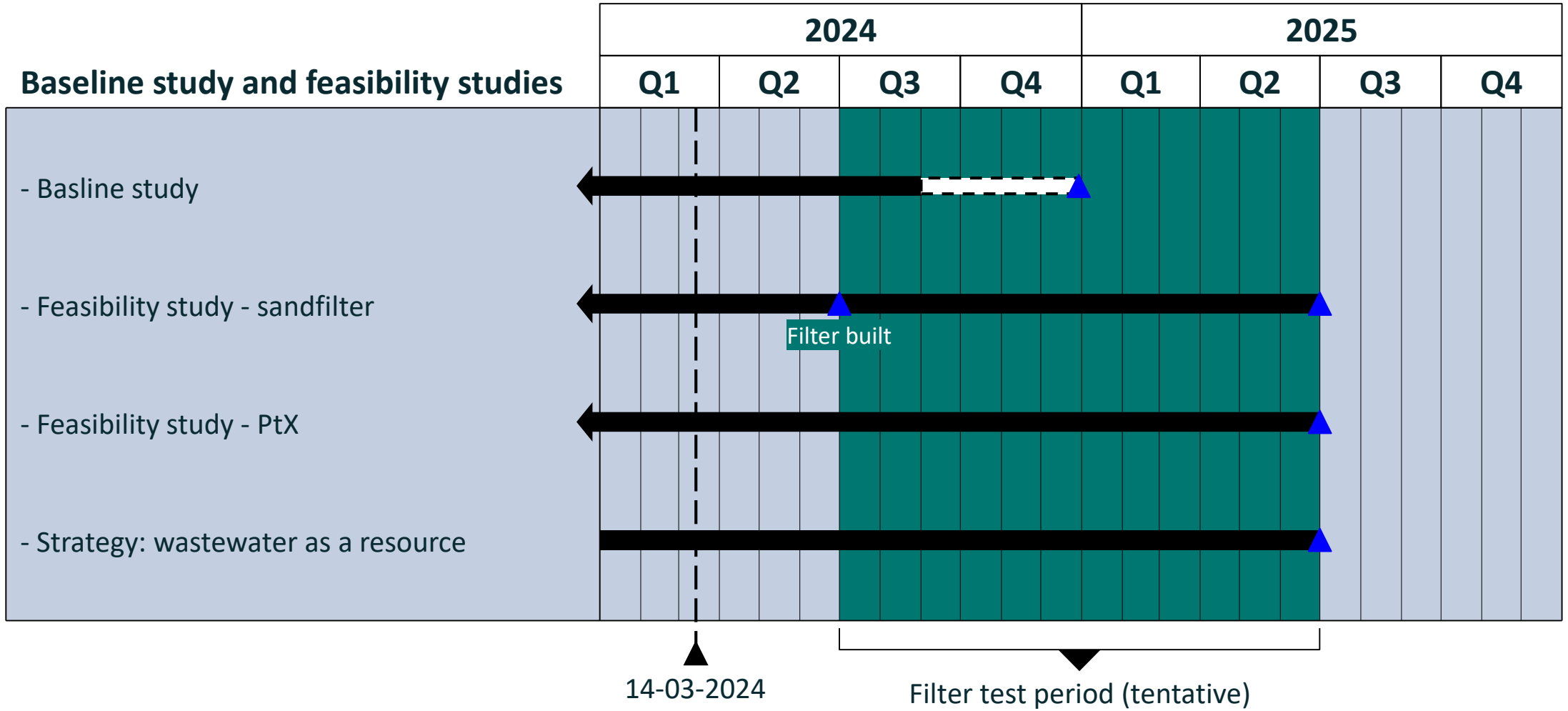
The process – wastewater



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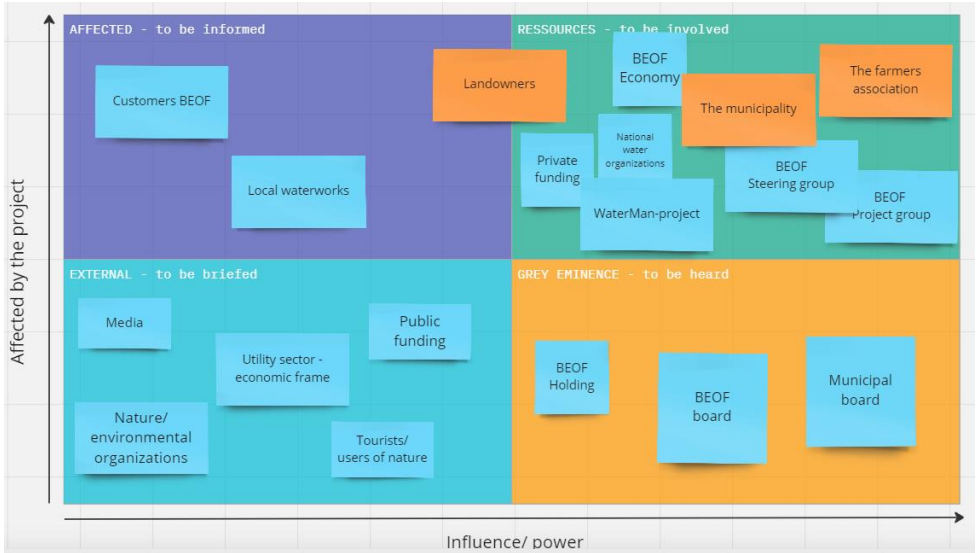
Potential strategic synergies – surface water

- Potential strategic synergies with BEOF activities
  - Groundwater protection / excess stormwater WWTP
    - Wetlands
    - “Miniwetlands”
    - Recreational areas
    - Irrigation reservoirs
  - Preparatory surveys
    - GIS/Scalgo?



BORNHOLMS ENERGI & FORSYNING

1st Peer & expert review session: Recommendations & conclusions

Comments from the peer & expert review:

- Consider different water qualities of effluent from the new centralised WWTP in planning of your treatment process.
- Alternative water sources (than water reuse) could be considered in the strategy:
  - Drainage water from the fields or other surface water that could be used? What quality aspects need to be monitored due to agriculture?
  - Desalinization for Power to X.
- Strategic synergies with other BEOF activities:
  - Wetlands are very good to gain mutual benefits – ecosystem services, but cooperation with landowners is the key. Plan how to engage the landowners in creation of wetlands.
- The relation of the strategy to Bornholm's climate adaptation plan and other potential strategic documents in Bornholm should be investigated, and municipal authorities should be approached for potential cooperation.

Related project examples:

- WaterCoGovernance: https://northsearegion.eu/watercog/
  - Pilot: Increased cooperation and involvement in relation to wetlands https://northsearegion.eu/watercog/pilot-projects/involving-stakeholders-in-wetland-development-dk/
  - Synthesis on how to engage stakeholders: https://northsearegion.eu/media/16681/final_watercog_pilotsevaluation_synthesis.pdf
- TOPSOIL: https://northsearegion.eu/topsoil/
  - Pilot: Sustainable Dwarsdiep catchment: https://northsearegion.eu/topsoil/pilot-areas/nl-2/
  - Pilot: Holistic water and soil management in East Anglia: https://northsearegion.eu/topsoil/pilot-areas/uk-2/
- Blue Transition: https://www.interregnorthsea.eu/blue-transition/
  - Pilot: Future scarcity of fresh and clean groundwater on the island of Endelave https://www.interregnorthsea.eu/blue-transition/pilots/dk3-endelave
- InnovatIon - efficient desalination: https://www.innovat-ion.de/en-US
- Research into the use of microalgae for desalination (in German only): https://green-economy-bremerhaven.de/2023/09/alge-macht-salzwasser-suess/

Elaboration on local model strategy: Bornholm / DK

Interreg Baltic Sea Region

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Status update

Water recycling strategy for Bornholm Island / DK

Bornholm's Energy & Utility Co. A/S

18 September 2024

Status on local model strategy on Bornholm– Wastewater as a resource

BORNHOLMS ENERGI & FORSYNING

Sara Björkqvist
Hamburg – 18-09-2024

Agenda

- The frame – strategic documents and legislation
- The local model strategy – wastewater as a resource
- Awareness raising activities

The frame – strategic documents & legislation

BEOF's business strategy
"The future wastewater system"

- Centralization of WWTPs
- Wastewater as a resource

Bornholm's municipality's
"Wastewater treatment plan"

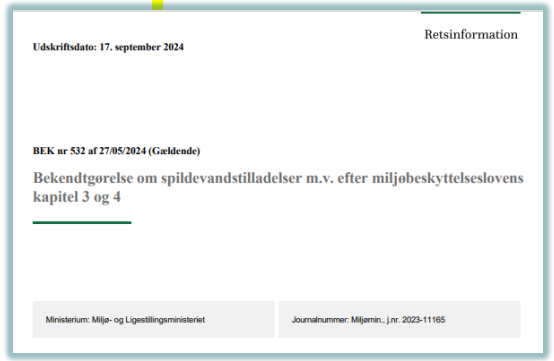
- Politically adopted for 2023-2027
- No reuse strategy
- No further sewer separation of rainwater/ stormwater, instead joint treatment with wastewater

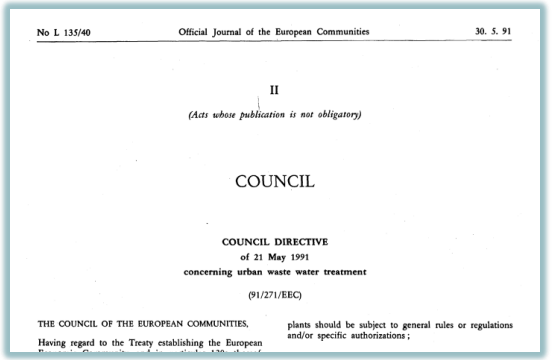
National legislation
"Wastewater regulation"

- No reuse promotion
- Will be updated in 2027, implementing EU's new urban wastewater treatment directive

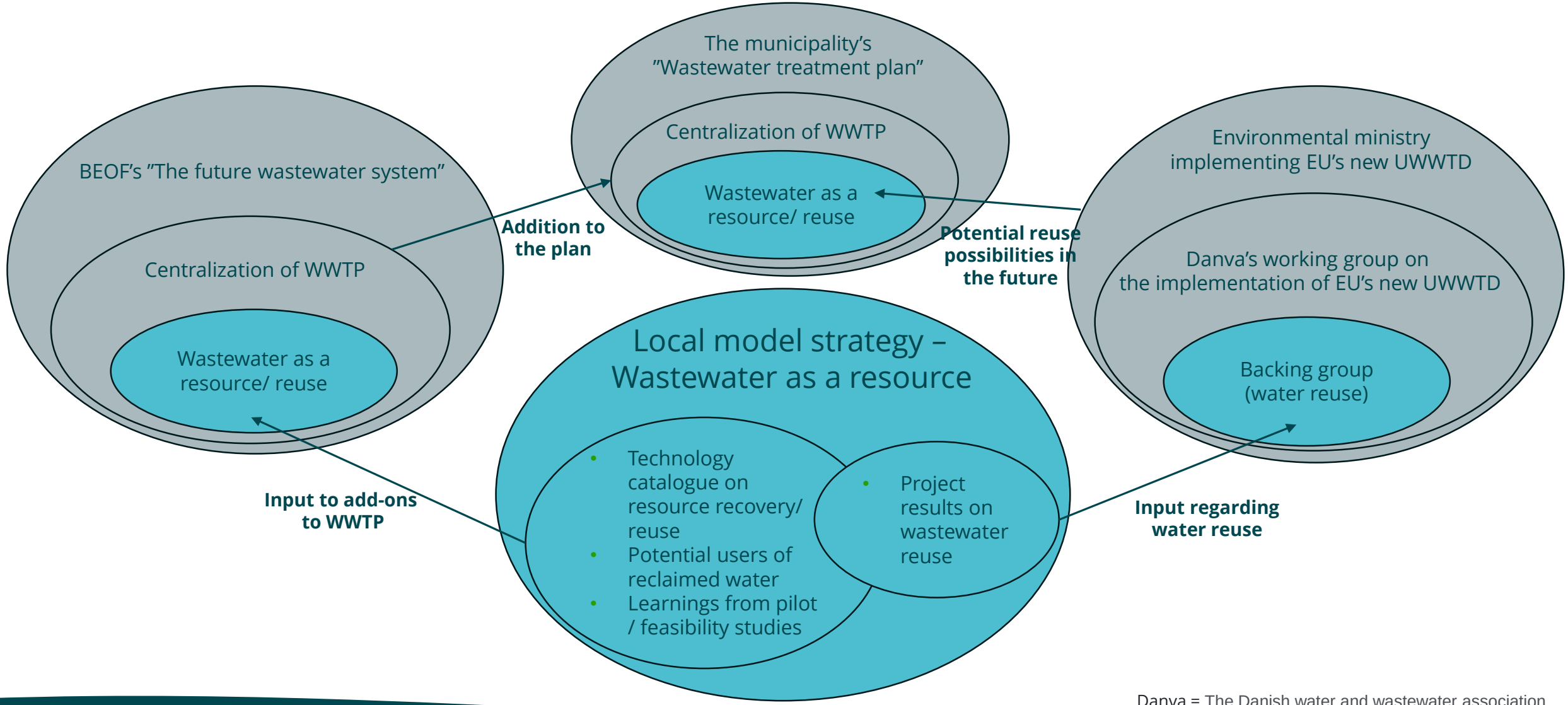
EU directive
"Urban wastewater treatment directive (UWWTD)"

- New directive coming in autumn 2024
- Quaternary treatment requirements – micropollutants
- Reuse promotion



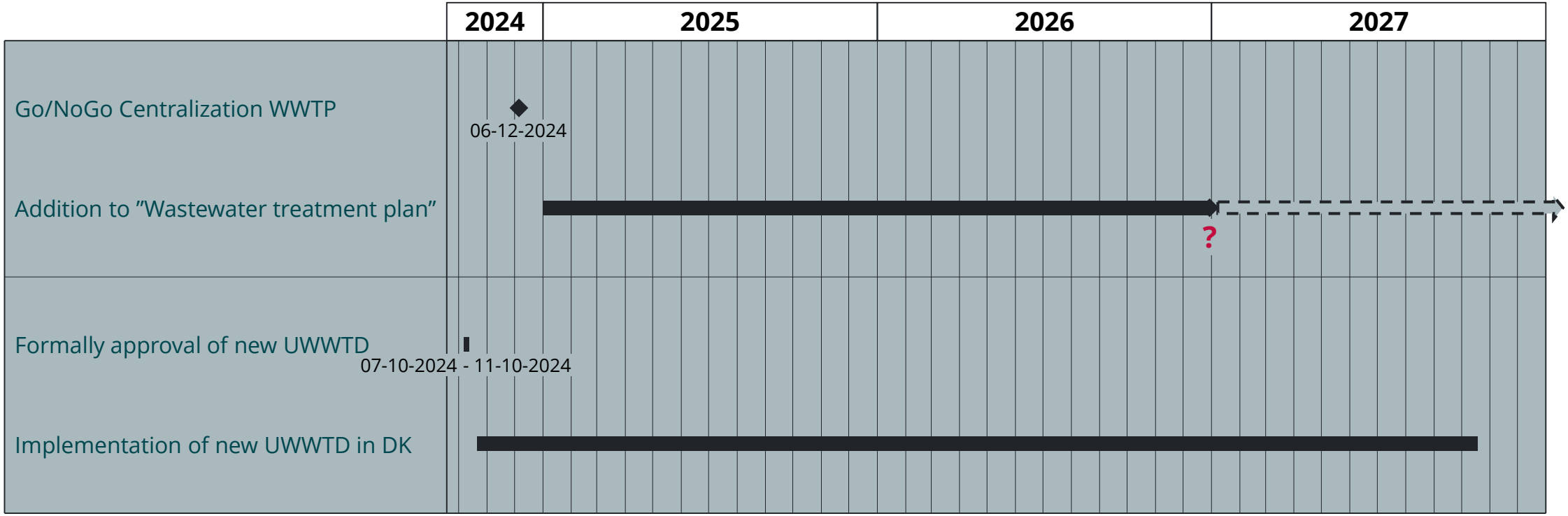


The local model strategy – wastewater as a resource



Danva = The Danish water and wastewater association

The local model strategy – timeframe



Awareness raising activities

Planned activities

- Demo of pilot on the 19th of September 2024, the municipality's center for environment is invited
- Workshop on water reuse?

Continuous activities

- Awareness raising internally in the project group working on the centralization of the WWTP
- Awareness raising through participation in Danva's backing group on water reuse

Interreg Baltic Sea Region

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2nd Peer-review session

Water recycling strategy for Bornholm Island / DK

Bornholm's Energy & Utility Co. A/S

3 April 2025

Status on local model strategy on Bornholm– Wastewater as a resource

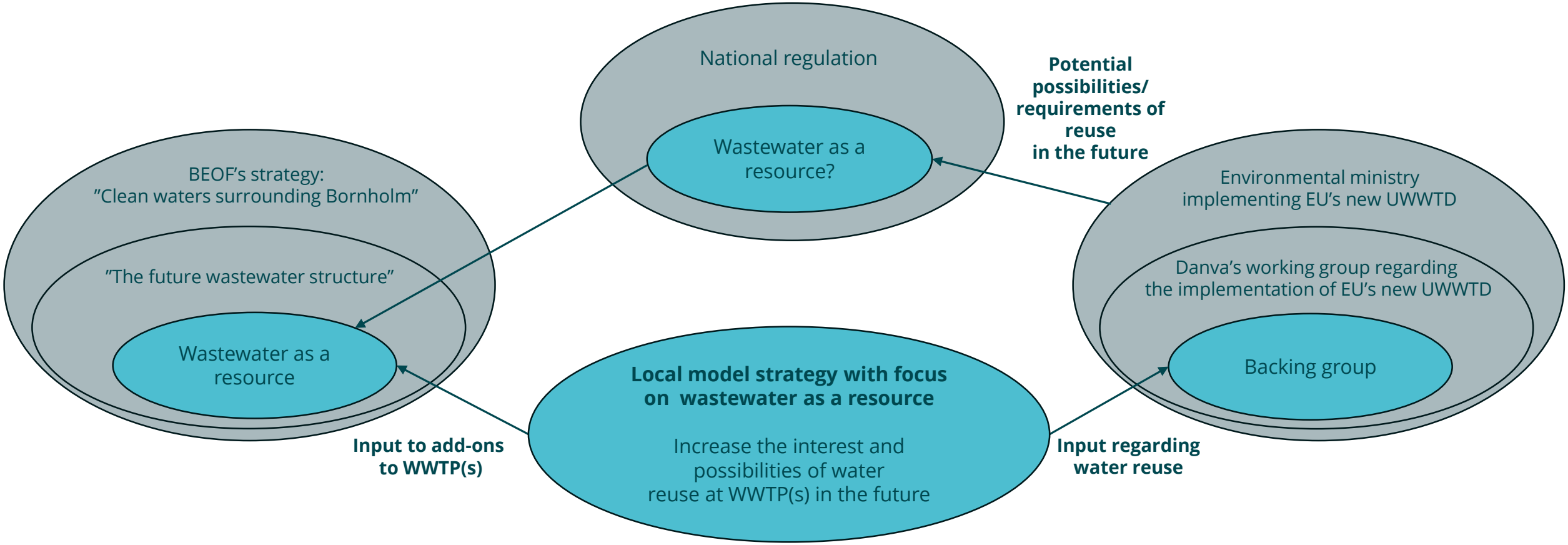
BORNHOLMS ENERGI & FORSYNING

Liepāja – April 3, 2025

Agenda

- Scope, outline & structure
- Status on regulations & future plans
- Proposed goals & measures
- Anchoring the strategy as a guiding framework for future actions
- Schedule & steps for finalizing the strategy

Scope, outline & structure



Danva = The Danish water and wastewater association

Status on regulations and future plans

- The new UWWTD
  - Will be implemented in DK by the 1st of July 2027
  - Evaluations in 2033 and 2040 will look at national water reuse plans
- New national regulation on technical water
  - Possibility to establish a technical water company
  - Expected to enter into force this summer
- EU 2020/741 on minimum requirements for water reuse
  - Implementation put on hold temporarily
- BEOF's "The future wastewater structure" – Centralization of WWTPs or not?
  - Decision about the structure will be taken in 2028
  - Regardless of centralization or not, the new structure/ updated structure is expected to be in place by 2038

Proposed goals & measures

- Increase the interest and possibilities of reuse of wastewater at the WWTP(s) in the future
  - Potential consumers: Mapping and identification of potential consumers
  - Technical knowledge: Overview and library on treatment technologies for wastewater reuse
  - Wastewater quality: "Data bank" on existing knowledge and data (focused on contaminants)
  - Laws and regulations: Keep updated on news and implementations

  - Increase awareness, interest and acceptance: Workshop on "Wastewater as a resource" & showcasing wastewater reuse

  - Authorities: Actively participate in hearings etc. of new regulations
  - Invite relevant decision makers/ stakeholders to Round Table Talks in Brussels

  - Networks: Stay connected and check in for news and inspiration
  - Sharing knowledge: WaterMan-project results shared with the DANVA backing group on the implementation of the new UWWTD

Potential consumers

- Mapping of water consumers and identification of potential consumers of reclaimed water

High quality water

Water consumer	Quality	Transportation
Breweries	+++	Pipeline
Dairy company	+++	Pipeline
Fish factories	+++	Pipeline
Laundry	+++	Pipeline
Livestock / farming	+++	Pipeline
Slaughterhouse	+++	Pipeline
Swimming pools	+++	Pipeline
PtX in the future?	+++	Pipeline

Medium quality water

Water consumer	Quality	Transportation
Agricultural irrigation	++	Pipeline
Irrigation parks / trees	++	Tank trailer
Cleaning streets	++	Tank trailer
Irrigation golf clubs	++	Pipeline
Metal industry	++	Pipeline
Concrete factory	++	Pipeline
Car wash	++	Pipeline / tank?
WWTP – internal reuse	++	÷

Low quality water

Water consumer	Quality	Transportation
Sewer inspection and flushing	+	Tank trailer

Technical knowledge

- Overview of technologies for reuse

Treatment technologies for water reuse

Treatment objective	Process	
Removal of suspended solids	• Coagulation • Flocculation • Sedimentation	• Media filtration • Microfiltration (MF) • Ultrafiltration (UF)
Reduce concentrations of dissolved chemicals	• Ion exchange • Biologically active filtration (BAF)	• Reverse osmosis (RO) • Nanofiltration (NF) • Granular activated carbon (GAC)
Disinfection	• Ultraviolet disinfection (UV) • Chlorine/chloramines • Nature based solutions (NbS)	• Peracetic acid (PAA) • Chlorine dioxide • Ozone (O_3)
Removal of trace organic compounds	• O_3 • O_3 + BAF • NF/RO	• GAC • NbS • Advanced oxidation processes (AOP)
Stabilization	• Sodium hydroxide • Lime stabilization	• Calcium chloride • Blending
Aesthetics	• O_3 + BAF	• MF/RO
Salinity	• RO • Ion exchange	• Electrodialysis

Source: US EPA Potable Reuse Compendium, 2017.

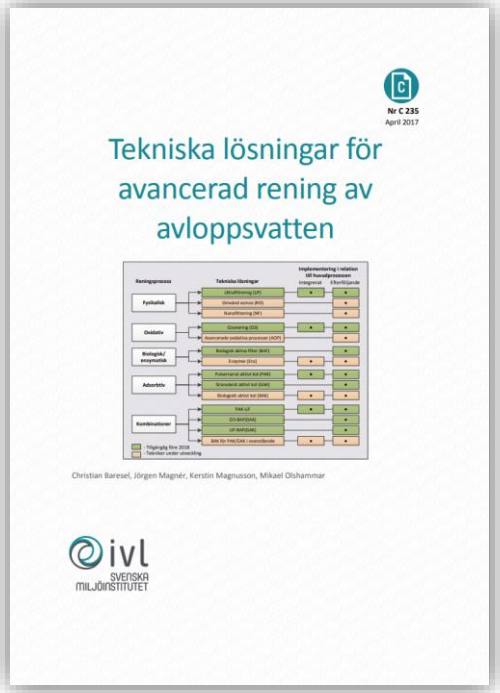
Pros/ cons (energy demand, climate footprint, biproducts etc.)

Source: WaterMan – 1st metthod & tool workshop. Water reuse with focus on risk & life cycle assessment.
Workshop by KWB in Schweinfurt on 12.06.2023

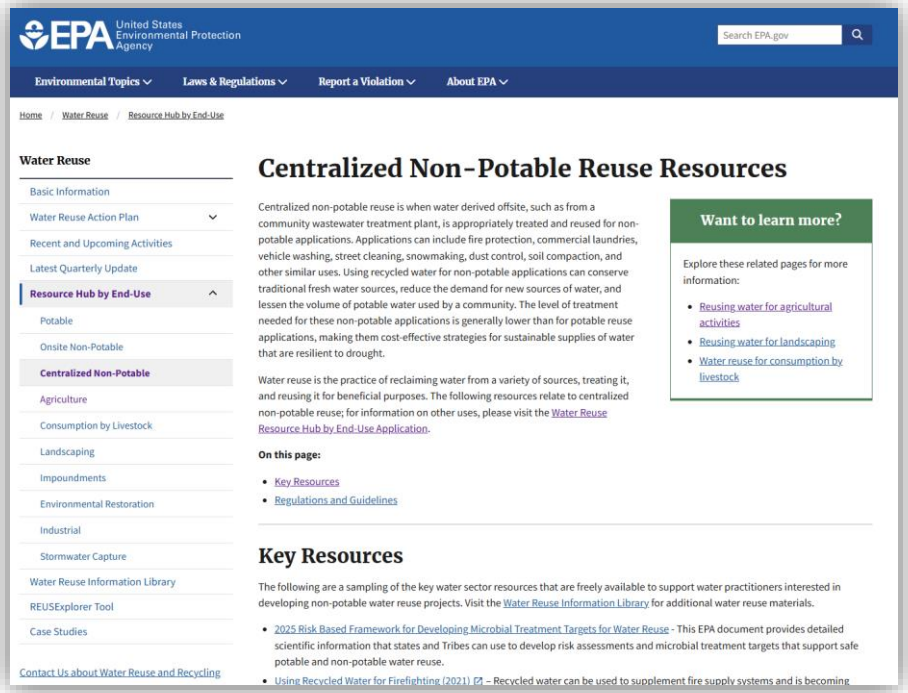
Technical knowledge

- Library on technologies for reuse

https://www2.mst.dk/Udgiv/publikationer/2021/03/978-87-7038-291-5.pdf



Tekniska lösningar för avancerad rening av avloppsvatten



Centralized Non-Potable Reuse Resources | US EPA

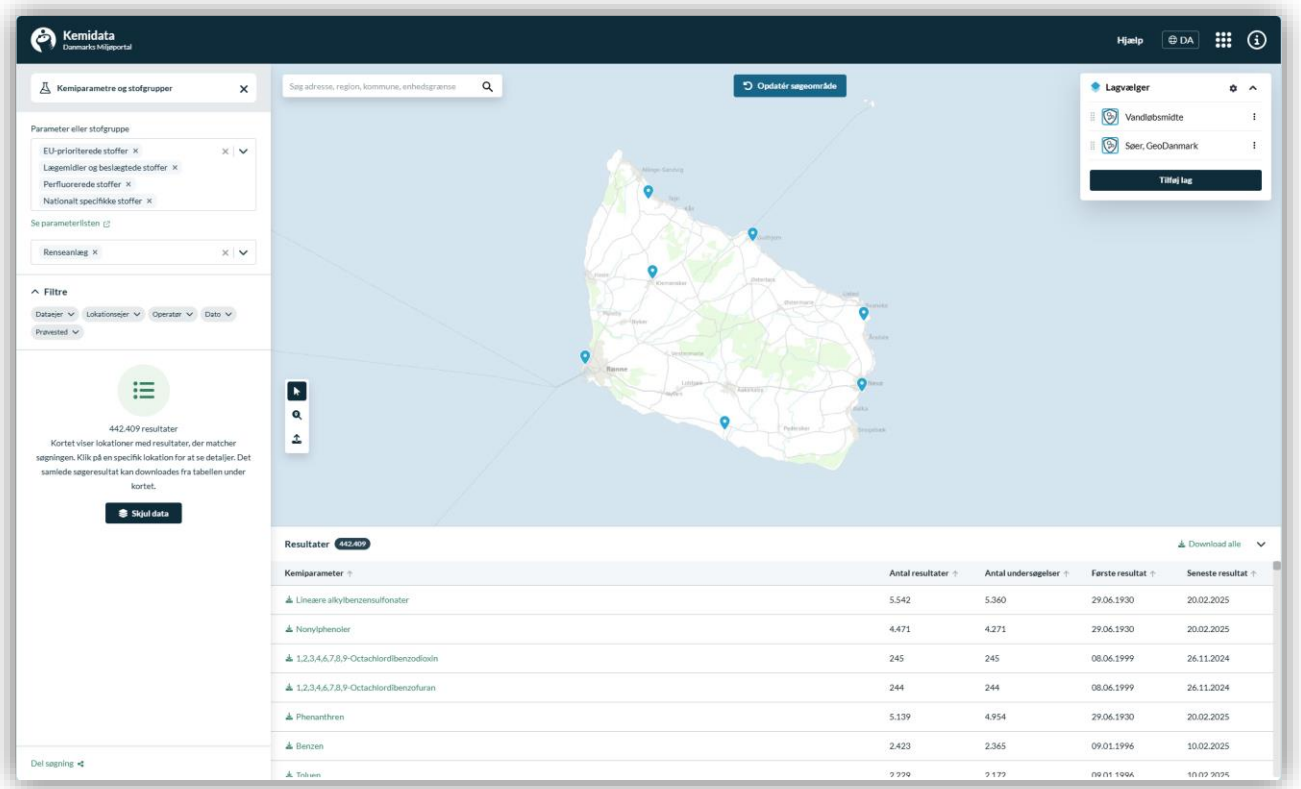
Wastewater quality

- Mapping of wastewater quality and risk of contaminants

WWTP	Boderne	Melsted	Nexø	Rønne	Svaneke	Tejn	Vestermarie
Industries / factories / hospitals etc.	• Dentist • Heat plants • Retirement home • Anti corrosion workshop • Car workshop • Machine workshop • Undercarriage handling workshop	• Car workshop • Retirement home • Smoke house	• Car workshop • Fish factory • Retirement home • Smoke house	• Brewery • Car wash • Car workshop • Concrete factory • Cruise ships • Dairy company • Dentist • Heat & power plant • Dry cleaner • Fire drill site • Fish factory • Hospital • Landfill • Laundry • Restaurants and hotels • Retirement homes • Slaughterhouse • Smoke house • Steel industry	• Brewery • Heat plants • Dentist • Car workshop • Fish factory • Restaurants • Smoke house	• Blacksmith • Brewery • Car wash • Fire drill site • Restaurants and hotels	÷
Contaminants	Literature study based on categories above						
Contaminants	Overview of data on contaminants monitored in wastewater and waterbodies by national monitoring program						

Wastewater quality

- Overview of data on contaminants monitored in wastewater by national monitoring program



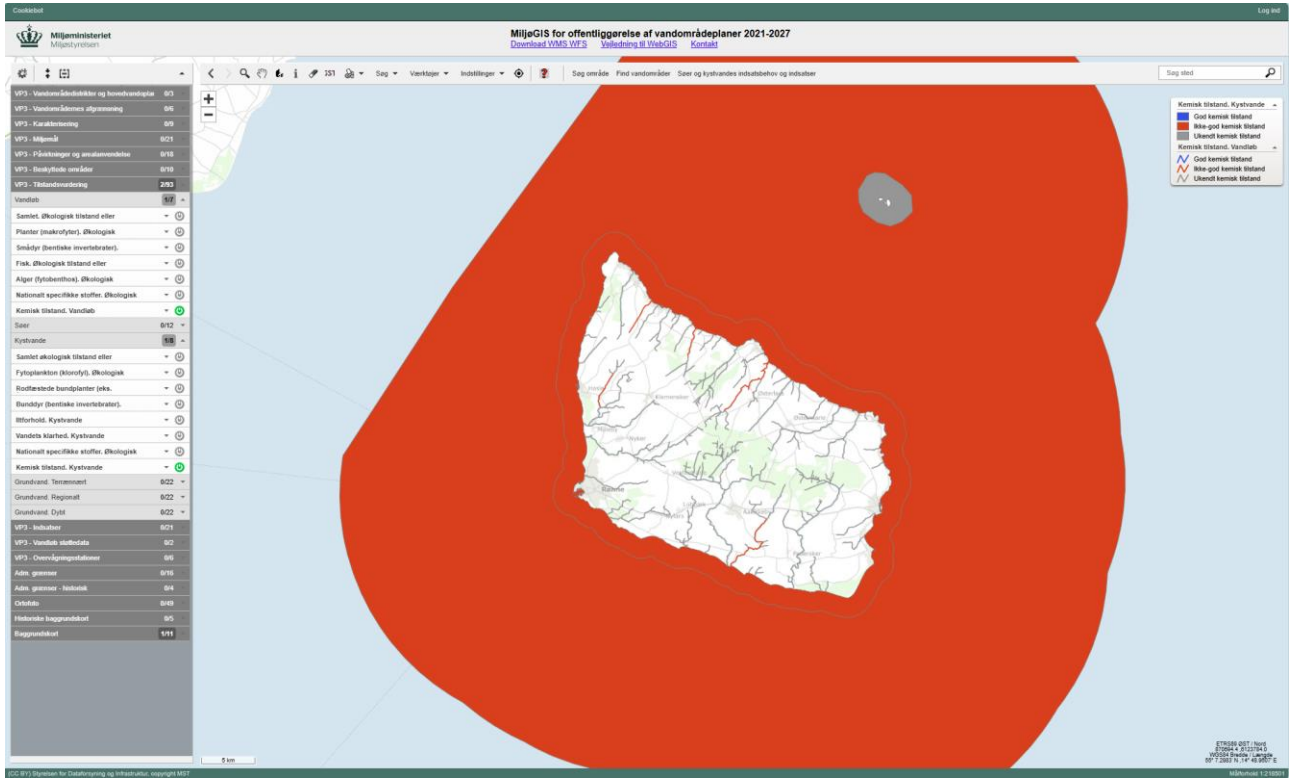
https://kemidata.miljoeportal.dk/

Pharmaceuticals @Svaneke WWTP 2011-2016

BORNHOLMS ENERGI & FORSYNING

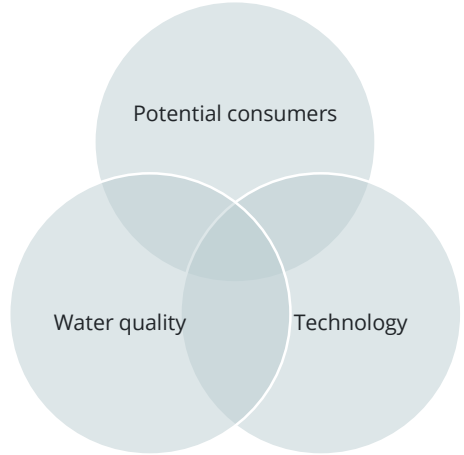
Wastewater quality

- Overview of data on contaminants monitored in waterbodies / recipients of wastewater



https://miljoegis.mim.dk/spatialmap?profile=vandrammedirektiv3-2022

- To sum up: Existing data indicates the water quality and what to be aware of in a potential reuse case
  - Input to technology requirements
  - Input to a monitoring program
  - Input to a risk assessment



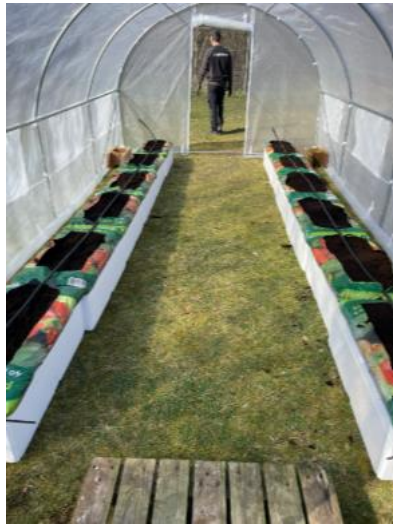
Increase awareness, interest and acceptance

- Workshop on "Wastewater as a resource" took place the 20th of March
  - Participants: Local farmers, Bornholm’s agriculture association, Agriculture consultant company, Bornholm's waste company, Bornholm’s municipality, Danske Bank and Bornholm's Energy & Utility
  - Visiting Svaneke WWTP and the pilot
  - Identifying barriers for water reuse
  - Dreaming about the future
  - Coming up with possibilities, low hanging fruits and necessary first steps

- Take home messages
  - There is an interest in use of reclaimed water for agricultural irrigation
  - Some barriers mentioned: Distribution infrastructure, economy – who pays for what, limited use during October-March and years with enough precipitation, regulatory barrier regarding the use of stormwater/ drainage water and long processing time for environmental permits

Increase awareness, interest and acceptance

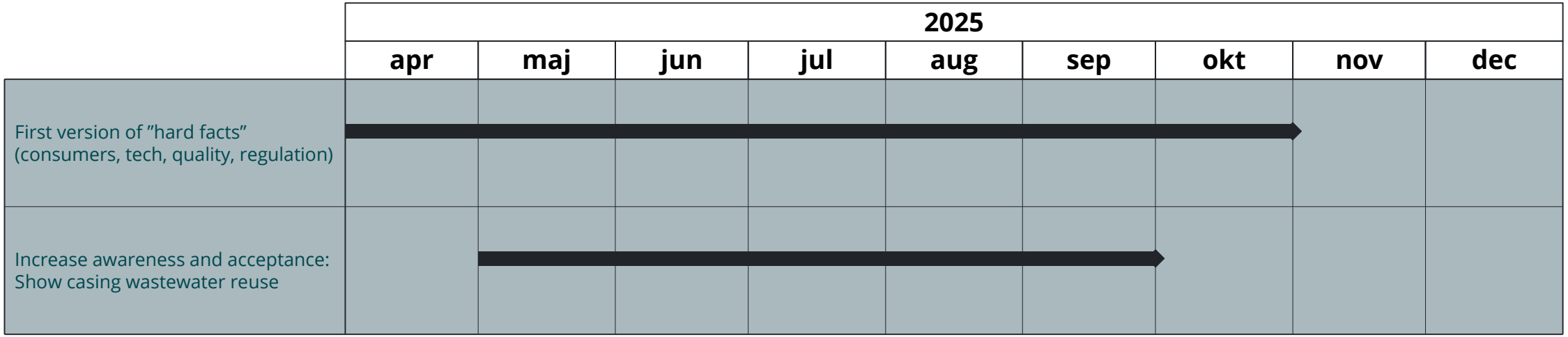
- Showcasing wastewater reuse (irrigation in green house)
- The citizens of Svaneke will be invited to visit the site during the Spring
- Interreg South Baltic's Annual event will visit the site on 24th of September



Anchor as a guiding framework for the future

- Anchored in the project group for "The future wastewater structure" and "Wastewater as a resource“
- Dynamic documentation updated frequently
- Regularly followed up on in the project group

Schedule & steps for finalizing the strategy



Continuous activities: networking, sharing knowledge, active participation in hearings on regulations etc.

Contact: Sara Björkqvist & Paulo Silva

2nd Peer & expert review session: Recommendations & conclusions

- It is very good that the strategy is concentrating on the areas where there is power to influence (feasibility) and not a general strategy just listing “what is possible.
- Recommendation: to have a look into OOMV (east Freisia) how they strategically framed the topic of water reuse in similar applications like in Bornholm (e.g. industrial re-use / PtX).
- Consider getting in contact and doing workshops with also other groups than farmers (e.g. municipality greenery department). Also: send the message to National Authorities & other decisive bodies that the potential users (e.g. farmers) understand that recycling could be a way to reduce the use of high-quality water for non-drinking purposes, and are positive for doing it, but are blocked by the current legislation.

Elaboration on local model strategy: Bornholm / DK

Interreg Baltic Sea Region

Co-funded by the European Union

SUSTAINABLE WATERS WaterMan

Final review

Water recycling strategy for Bornholm Island / DK

Bornholm's Energy & Utility Co. A/S

26 September 2025

Strategy Overview

➢ Scope of the Strategy

The WaterMan Local Model Strategy for Bornholm positions wastewater as a strategic resource in the island's transition toward climate resilience and a circular economy. It integrates:

- EU and Danish regulatory frameworks (UWWTD, technical water legislation, EU 2020/741)
- BEOF's infrastructure planning of the future WWTPs
- Stakeholder engagement and technical pilots (e.g., Svaneke WWTP)

The strategy is embedded in one active project group:

- Future wastewater structure – includes the theme Wastewater as a resource

➢ Main Goals

- Increase interest and feasibility of wastewater reuse at WWTPs
- Demonstrate practical reuse scenarios (agriculture, PtX, industry, municipal use)
- Support regulatory alignment and contribute to national/EU-level discussions
- Build public trust and stakeholder engagement through workshops, pilots, and open events
- Develop knowledge tools (technology library, wastewater quality data bank)
- Ensure coordination with BEOF's innovation department during WWTP centralization planning.

➢ What Problem / Opportunity Does It Address?

- **Problem**: Wastewater is traditionally treated as a waste product, with limited reuse and environmental discharge impacts.
- **Opportunity**: Reframing wastewater as a valuable resource enables:
  - Sustainable water management
  - Alternative to freshwater sources
  - Integration with energy systems (e.g., PtX)
  - Compliance with evolving EU directives
  - Local innovation and leadership in circular water solutions

Local / Regional Context and Background

➢ **Description of the Region / Organization / Sector**

Bornholm is a Danish island in the Baltic Sea known for its strong environmental ambitions and commitment to sustainability. The local utility, Bornholm Energi & Forsyning (BEOF), plays a central role in water and wastewater management. The WaterMan strategy is developed in collaboration with BEOF, the municipality, and regional stakeholders, positioning Bornholm as a living laboratory for circular water solutions.

The sector focus is on wastewater treatment and reuse, with integration into agriculture, industry, and energy systems (e.g., Power-to-X).

➢ **Existing Relevant Strategies or Frameworks**

- **BEOF's "Clean Waters Surrounding Bornholm" Vision**: A long-term ambition to improve water quality and environmental protection.
- **EU Urban Wastewater Treatment Directive (UWWTD)**: Sets the regulatory foundation for reuse, nutrient recovery, and pollution control.
- **EU Regulation 2020/741**: Establishes minimum requirements for agricultural reuse (used as a reference).
- **Denmark's Technical Water Legislation (2025)**: Enables creation of technical water companies for non-potable reuse.
- **Water Framework Directive**: Guides environmental monitoring and waterbody protection.

➢ **Key Environmental, Socio-Economic, Institutional Conditions Shaping the Strategy**

- **Environmental**: Bornholm's sensitive coastal ecosystems and limited freshwater resources make reuse a strategic necessity.
- **Socio-Economic**:
  - Agricultural interest in reclaimed water for irrigation.
  - Reclaimed water for PtX – potential interest from a company.
  - Economic concerns around infrastructure investment and cost-sharing.
  - Seasonal limitations affecting reuse feasibility.
- **Institutional**:
  - Strong local governance and stakeholder collaboration.
  - Active participation in national working groups (e.g. The Danish water and wastewater association (DANVA)).
  - Embedded in the project groups: "Future Wastewater Structure"
  - Innovation department of BEOF will play a key role in integrating reuse solutions into future WWTP designs.

Development Process

- **Who Led or Contributed?**
  - **Lead Organization**: Bornholm Energi & Forsyning (BEOF)
  - **Contributors**:
    - Bornholm Municipality
    - Danish Ministry of Environment
    - DANVA (Danish Water and Wastewater Association)
    - EnviDan (technical consultant for pilot evaluation)
    - Local stakeholders: farmers, industry, waste company, financial institutions
    - EU-level partners via WaterMan and Interreg South Baltic

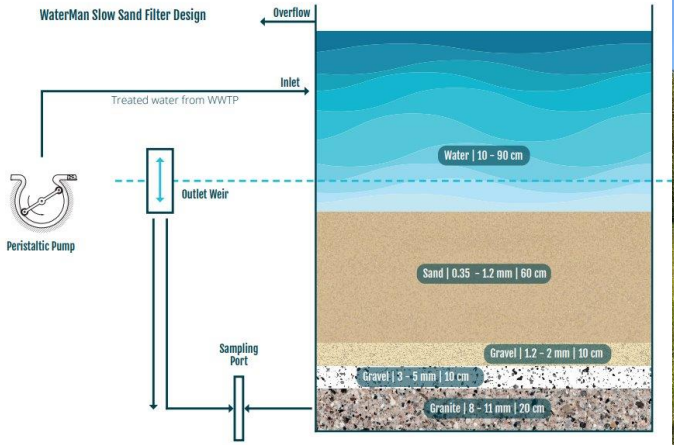
- **Stakeholder Engagement and Consultation Process**
  - **Workshops**:
    - *"Wastewater as a Resource"* workshop (March 20) with farmers, consultants, municipality, and BEOF
  - **Site Visits**:
    - Svaneke WWTP and greenhouse irrigation pilot
    - Municipality Environmental department
  - **Public Events**:
    - Symsites sister project General Assembly
    - Interreg South Baltic Annual Event visit (Sept 24)
  - **Consultations**:
    - Participation in national hearings and EU roundtables
    - Input to DANVA backing group regarding the implementation of the new UWWTD

- **Timeline / Milestones in Strategy Elaboration**
  - **2023–2024**: Initial mapping of reuse scenarios, contaminants, technologies, and potential end-users of recycled water
  - **2024**: Launch of Svaneke WWTP pilot and stakeholder workshops
  - **Spring 2025**: Public engagement and greenhouse irrigation demonstration
  - **Summer 2025**: New Danish technical water legislation enters into force
  - **September 2025**: International exposure via Interreg event

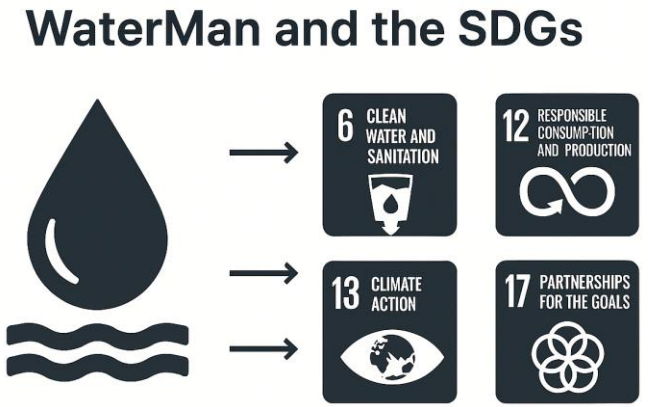
Core Components

- **Main Objectives and Focus Areas**
  - **Reframe wastewater as a resource** within the broader water cycle.
  - **Enable practical reuse** at WWTPs for:
    - Agricultural irrigation
    - Internal reuse at the WWTP and sewer inspection and flushing.
    - Power-to-X (PtX) hydrogen production
    - Municipal applications
  - **Align with EU and Danish regulations** (UWWTD, technical water legislation, EU 2020/741).
  - **Build public trust and stakeholder engagement** through transparent communication and demonstration.
  - **Develop knowledge tools** to support decision-making:
    - Technology library
    - Wastewater quality data bank

- **Key Actions, Measures, Initiatives**
  - **Pilot Project**: Slow sand filter at Svaneke WWTP for agricultural reuse.
  - **Workshops & Events**:
    - "Wastewater as a Resource" workshop (March 2025)
    - Symsites GA
    - Interreg South Baltic Annual Event site visit (Sept 2025)
  - Explore **practical distribution models** for agricultural reuse (e.g., water trucks, pipe-in-pipe systems).
  - **Stakeholder Mapping**: Identification of potential water consumers and contaminant contributors.
  - **Technology Evaluation**: Comparative analysis of treatment options (e.g., MF, UF, sedimentation).
  - **Environmental Monitoring**:
    - Wastewater and waterbody contaminant mapping by investigating national databases (KemiData, MIljøGIS)
  - **Governance Anchoring**:
    - Embedded in project group: *"Future Wastewater Structure"*
    - Dynamic documentation and regular follow-up



Expected Impact / Outcomes



➢ Links to Policy Goals / Sustainable Development Targets

The WaterMan strategy supports multiple EU and global policy objectives:

- **EU Urban Wastewater Treatment Directive (UWWTD)**: Promotes water reuse, nutrient recovery, and pollution reduction.
- **EU Circular Economy Action Plan**: Encourages resource efficiency and reuse of treated wastewater.
- **UN Sustainable Development Goals (SDGs)**:
  - **SDG 6** – Clean Water and Sanitation
  - **SDG 12** – Responsible Consumption and Production
  - **SDG 13** – Climate Action
  - **SDG 17** – Partnerships for the Goals

➢ Anticipated Environmental, Social, Economic Impact

Environmental

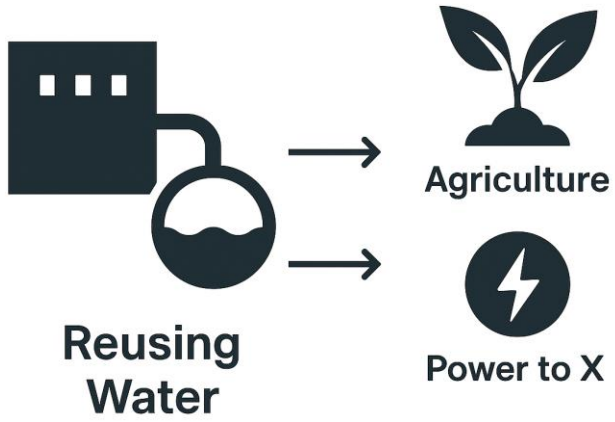
- Reduced discharge of nutrients and contaminants into sensitive coastal waters.
- Lower freshwater abstraction through reuse.
- Enhanced biodiversity protection via improved water quality.

Social

- Increased public awareness and acceptance of reuse.
- Strengthened local engagement through workshops and open-door events.
- Improved water security for agriculture and municipalities.

Economic

- Cost savings for water-intensive sectors (e.g., farming, PtX).
- Potential for new business models (e.g., technical water companies).
- Long-term infrastructure efficiency through centralized planning.



Implementation Considerations

➢ Enabling Conditions for Implementation

To successfully implement the WaterMan strategy, the following conditions are essential:

- **Regulatory Frameworks**:
  - Full implementation of the revised EU Urban Wastewater Treatment Directive (by July 2027).
  - Entry into force of Denmark's technical water legislation (summer 2025).
- **Institutional Support**:
  - Continued engagement from BEOF, Bornholm Municipality, DANVA, and national ministries.
  - Active coordination within project group (*"Future Wastewater Structure"*).
- **Technical Capacity**:
  - Access to appropriate treatment technologies (e.g., sand filters, MF/UF, disinfection).
  - Integration of monitoring data from national platforms (KemiData, MiljøGIS).
- **Stakeholder Engagement**:
  - Ongoing workshops, site visits, and public events to build trust and awareness.
  - Inclusion of farmers, industry, and citizens in planning and feedback loops.
  - Continuous dialogue with regulatory bodies (National Authorities, DANVA) to streamline approvals.

➢ Potential Challenges / Barriers

- **Infrastructure Limitations**:
  - Lack of distribution systems for reclaimed water.
  - Agricultural irrigation faces logistical challenges; distribution options under evaluation include mobile water supply and integrated piping.
  - Seasonal constraints
- **Economic Concerns**:
  - Unclear cost-sharing models (who pays for reuse infrastructure and operations).
- **Regulatory Hurdles**:
  - Long processing times for environmental permits.
  - Uncertainty around the implementation of EU Regulation 2020/741 in Denmark.
- **Public Perception**:
  - Need for clear communication to address safety concerns and build acceptance.

Active Coordination

within project group ('Future Wastewater Structure')

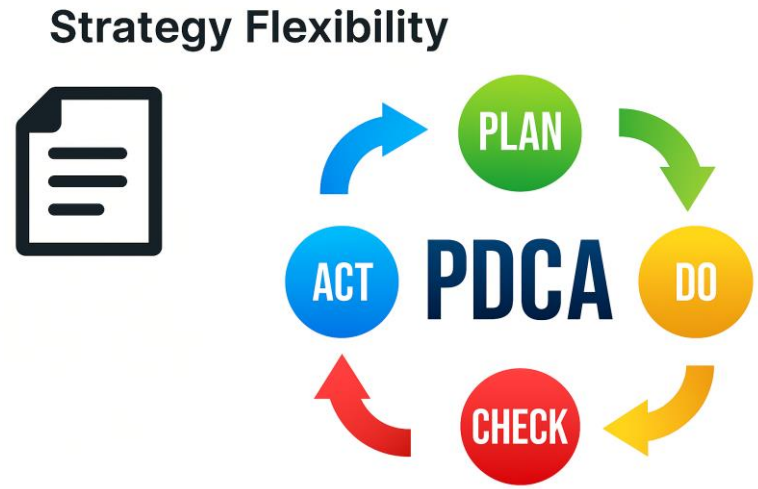
Adaptability

➢ Flexibility of the Strategy

The WaterMan strategy is designed as a **living framework**, allowing for adaptation to:

- **New regulations** (e.g., updates to UWWTD, technical water legislation)
- **Emerging contaminants** (e.g., PFAS, pharmaceuticals, microplastics)
- **Technological advancements** in treatment and monitoring
- **Stakeholder feedback** from workshops, pilots, and consultations

Its modular structure enables integration of new reuse scenarios, data sources, and pilot results without disrupting the overall strategic direction.

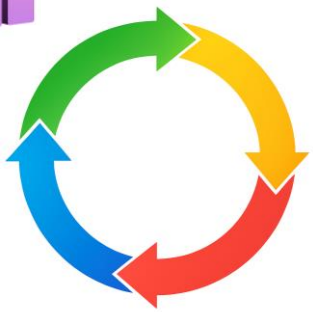


➢ Provisions for Updates / Revision

- **Dynamic Documentation**: Continuously updated to reflect:
  - Regulatory changes
  - Pilot findings (e.g., Svaneke WWTP)
  - Technological evaluations
  - Stakeholder input
- **Regular Follow-Ups**: Conducted within the anchor project group:
  - *"Future Wastewater Structure"*
- **Knowledge Tools**: The technology library and wastewater quality data bank are designed for ongoing expansion and refinement.

This ensures the strategy remains **relevant, responsive, and scalable** over time.

Relation to Other Strategic Documents and Scalability



➢ How Does the Strategy Complement Existing Plans?

The WaterMan strategy is closely aligned with and supplements several key frameworks:

- **BEOF's "Clean Waters Surrounding Bornholm" Vision**: WaterMan provides the technical and stakeholder roadmap to realize this ambition.
- **EU Urban Wastewater Treatment Directive (UWWTD)**: WaterMan supports early implementation and contributes practical insights to national working groups.
- **Denmark's Technical Water Legislation (2025)**: The strategy anticipates and prepares for the operationalization of technical water companies.
- **EU Regulation 2020/741**: WaterMan uses it as a benchmark for agricultural reuse standards.
- **Water Framework Directive**: Environmental monitoring and contaminant mapping are aligned with its goals.

➢ Potential for Scaling or Replication

Yes — the strategy is designed to be **scalable and transferable**:

- **Regional Replication**: Insights from Bornholm's pilot (e.g., Svaneke WWTP) are being processed into the **BSR Water Reuse Toolbox** (Deliverable D2.5), enabling peer learning across the Baltic Sea Region.
- **Sectoral Expansion**: Reuse scenarios can be adapted for:
  - Agriculture
  - PtX energy systems
  - Municipal landscaping and cleaning
- **Knowledge Tools**: The technology library and wastewater quality data bank are structured to support other utilities and municipalities.

Bornholm serves as a **model region**, demonstrating how small-scale, integrated strategies can inform broader national and EU-level planning.

Final Reflections

➢ **Biggest Surprise During Elaboration**

The **level of genuine interest from local stakeholders**, especially farmers and municipal actors, was a pleasant surprise. The March 20 workshop revealed a strong appetite for sustainable water solutions — not just in theory, but in practice.

➢ **A Moment of Doubt**

There was a point when the **regulatory uncertainty** around EU Regulation 2020/741 and the long permitting processes made it feel like progress might stall. However, by anchoring the strategy in active project groups and focusing on low-tech pilots like the **Svaneke sand filter**, momentum was regained through practical demonstration and stakeholder dialogue.

➢ **Tips / Insights / Recommendations**

- **Start with a pilot**: Even small-scale demonstrations can build trust and generate valuable data.
- **Engage early and often**: Stakeholder involvement from the beginning ensures relevance and buy-in.
- **Build flexible tools**: A living strategy with dynamic documentation allows for adaptation.
- **Use existing data platforms**: National tools like KemiData and MiljøGIS are invaluable for planning and compliance.
- **Engage innovation teams** early to align technical solutions with infrastructure plans.

➢ **Wish for the Strategy**

If we could wish for anything, it would be **a streamlined regulatory pathway for reuse projects** — one that balances environmental protection with innovation. This would accelerate implementation and unlock the full potential of wastewater as a resource across Denmark and beyond.

Farmer quote:

"The workshop gave us a real chance to speak openly, and it's clear that change is possible when we work together. I'm leaving with renewed energy and a sense that our input actually matters."

BORNHOLM

A MODEL REGION FOR CIRCULAR WATER SOLUTIONS

Interreg Baltic Sea Region

Co-funded by the European Union

BORNHOLMS ENERGI & FORSYNING

SUSTAINABLE WATERS WaterMan

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The „BSR Water Recycling Toolbox" was elaborated as part of the WaterMan project, which is co-financed by the European Union (European Regional Development Fund) and implemented within the Interreg Baltic Sea Region Programme. More information:

eurobalt.org/WaterRecyclingToolbox
interreg-baltic.eu/project/waterman

WaterMan promotes a Baltic Sea Region-specific approach to water recycling, which makes use of the alternation of too much and too little water that has become typical for humid areas in the EU to strengthen the resilience of local water supply. Building on this approach, the project supports municipalities and water companies in adapting their water supply strategies.